

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) An electrochemical cell comprising:
 - a membrane electrode assembly (~~MEA~~) comprising a first electrode, a second electrode, and a membrane disposed between and in fluid communication with the first and second electrodes;
 - a first cell separator plate disposed on ~~the first electrode~~ a same side of the MEA ~~membrane electrode assembly as the first electrode~~ and defining a first flow field ~~therebetween~~ between the first cell separator plate and the MEA, the first flow field proximate a first frame member;
 - a second cell separator plate disposed on ~~the second electrode~~ a same side of the MEA ~~membrane electrode assembly as the second electrode~~ and defining a second flow field ~~therebetween~~ between the second cell separator plate and the MEA, the second flow field proximate a second frame member; ~~[[and]]~~
 - a carbon layer comprising a plurality of continuous uninterrupted ~~with integrated~~ flowchannels disposed parallel to one another at the first flow field;
 - wherein each continuous uninterrupted flow channel of the plurality of continuous uninterrupted flowchannels ~~[[have]]~~ has a flow width that is equal to or less than the width of ~~[[the]]~~ a webbing between adjacent flowchannels; and
 - wherein each continuous uninterrupted flow channel of the plurality comprises a length and a width, the length being greater than the width, and the length of each continuous uninterrupted flow channel of the plurality extends substantially from one edge of the carbon layer to an opposite edge of the carbon layer.

2. (original) The electrochemical cell of Claim 1, wherein the carbon layer is compatible with a hydrogen environment, and has an electrical resistivity of equal to or less than about 0.73 Ohm-centimeters.

3. (original) The electrochemical cell of Claim 2, wherein the carbon layer has an electrical resistivity of equal to or less than about 0.73 Ohm-centimeters at a compressive load at the carbon layer of about 100 pounds-per-square-inch.

4. (currently amended) The electrochemical cell of Claim 1, further comprising:

a pressure pad disposed between the first cell separator plate and the carbon layer;
wherein the pressure pad produces sufficient to maintain a surface pressure at the MEA membrane electrode assembly of equal to or greater than about 150 pounds-per-square-inch in response to a compression amount of equal to or greater than 15 percent of an uncompressed thickness of the pressure pad.

5. (original) The electrochemical cell of Claim 4, wherein the pressure pad consists essentially of compressible carbon.

6. (currently amended) The electrochemical cell of Claim 1, wherein the carbon layer ~~is compressible sufficient to maintain~~ produces a surface pressure at the ~~MEA membrane electrode assembly~~ of equal to or greater than about 150 pounds-per-square-inch in response to a compression amount of equal to or greater than 15 percent of an uncompressed thickness of the carbon layer.

7. (original) The electrochemical cell of Claim 1, wherein the carbon layer is absent metal or metallic plating.

8. (original) The electrochemical cell of Claim 1, wherein the carbon layer comprises carbon paper, carbon sheet, carbon cloth, or any combination comprising at least one of the foregoing.

9. (currently amended) The electrochemical cell of Claim 1, wherein the carbon layer is porous and is in intimate contact with the ~~MEA~~ membrane electrode assembly, the porosity being sufficient for the diffusion of gas and liquid.

10. (original) The electrochemical cell of Claim 1, wherein the first frame member is absent fluid flow channels.

11. (original) The electrochemical cell of Claim 1, wherein the carbon layer is an assembly comprising:

a first layer having first fluid flowchannels oriented in a first direction; and

a second layer having second fluid flowchannels oriented in a second different direction;

wherein the first and second fluid flowchannels of the assembly permit lateral and longitudinal flow therethrough.

12. (original) The electrochemical cell of Claim 11, wherein the first fluid flowchannels, the second fluid flowchannels, or both, are pierced through the first and the second layer, respectively.

13. (original) The electrochemical cell of Claim 11, wherein the first fluid flowchannels, the second fluid flowchannels, or both, are embossed into the material of the first and the second layer, respectively.

14. (currently amended) The electrochemical cell of Claim 1, wherein at least one continuous uninterrupted ~~[[the]]~~ flowchannel~~[[s]]~~ of the plurality of continuous uninterrupted flowchannels ~~extend to~~ ~~[[the]]~~ interrupts an edge of the carbon layer.

15. (canceled)

16. (currently amended) The electrochemical cell of Claim 1, further comprising:

a porous support plate disposed between the ~~MEA~~ membrane electrode assembly and the second cell separator plate.

17. (currently amended) The electrochemical cell of Claim 1, further comprising:

a first gasket disposed between the first frame member and the ~~MEA~~ membrane electrode assembly, and a second gasket disposed between the second frame member and the ~~MEA~~ membrane electrode assembly, the gaskets suitable for gas and liquid sealing.

18. (currently amended) The electrochemical cell of Claim 1, further comprising:

a porous carbon gas diffusion layer (GDL) disposed between the carbon layer and the ~~MEA~~ membrane electrode assembly.

19. (currently amended) The electrochemical cell of Claim 18, wherein the ~~GDL~~ gas diffusion layer ~~is compressible sufficient to maintain~~ produces a surface pressure at the ~~MEA~~ membrane electrode assembly of equal to or greater than about 150 pounds-per-square-inch in response to a compression amount of equal to or greater than 15 percent of an uncompressed thickness of the gas diffusion layer.

20. (currently amended) The electrochemical cell of Claim 18, wherein the ~~GDL~~ gas diffusion layer has an electrical resistivity of equal to or less than about 0.73 Ohm-centimeters at a compressive load at the ~~GDL~~ gas diffusion layer of about 100 pounds-per-square-inch.

21. (currently amended) The electrochemical cell of Claim 18, wherein the ~~GDL~~ gas diffusion layer comprises carbon paper, carbon sheet, carbon cloth, or any combination comprising at least one of the foregoing.

22. (currently amended) The electrochemical cell of Claim 18, wherein the carbon layer and the ~~GDL~~ gas diffusion layer each consist essentially of carbon.

23. (currently amended) An electrochemical cell comprising:

a membrane electrode assembly (~~MEA~~) comprising a first electrode, a second electrode, and a membrane disposed between and in fluid communication with the first and second electrodes;

a first cell separator plate disposed on ~~the first electrode~~ a same side of the ~~MEA~~ membrane electrode assembly as the first electrode and defining a first flow field ~~therebetween~~ between the first cell separator plate and the MEA, the first flow field proximate a first frame member;

a second cell separator plate disposed on ~~the second electrode~~ a same side of the ~~MEA~~ membrane electrode assembly as the second electrode and defining a second flow field ~~therebetween~~ between the second cell separator plate and the MEA, the second flow field proximate a second frame member; and

a porous carbon gas diffusion layer (~~GDL~~) comprising a plurality of continuous uninterrupted flowchannels disposed parallel to one another at the first flow field and in intimate contact with the ~~MEA~~ membrane electrode assembly;

wherein the GDL gas diffusion layer has an electrical resistivity of equal to or less than about 0.73 Ohm-centimeters at a compressive load at the GDL gas diffusion layer of about 100 pounds-per-square-inch; and

wherein each continuous uninterrupted flow channel of the plurality comprises a length and a width, the length being greater than the width, and the length of each continuous uninterrupted flow channel of the plurality extends substantially from one edge of the porous carbon gas diffusion layer to an opposite edge of the porous carbon gas diffusion layer.

24. (currently amended) The electrochemical cell of Claim 23, wherein the GDL gas diffusion layer is compressible sufficient to maintain produces a surface pressure at the MEA membrane electrode assembly of equal to or greater than about 150 pounds-per-square-inch in response to a compression amount of equal to or greater than 15 percent of an uncompressed thickness of the gas diffusion layer.

25. (currently amended) The electrochemical cell of Claim 23, wherein the GDL gas diffusion layer consists essentially of compressible carbon.

26. (currently amended) The electrochemical cell of Claim 23, wherein the GDL gas diffusion layer is porous and is in intimate contact with the MEA membrane electrode assembly, the porosity being sufficient for the capable of allowing diffusion of gas and liquid.

27. (canceled)

28. (new) The electrochemical cell of Claim 1, wherein each continuous uninterrupted flowchannel of the plurality extends through a thickness of the carbon layer.

29. (new) The electrochemical cell of Claim 1, wherein each continuous uninterrupted flowchannel of the plurality comprises a depth less than a thickness of the carbon layer.

30. (new) The electrochemical cell of Claim 1, wherein each continuous uninterrupted flowchannel of the plurality is disposed inboard of an edge of the carbon layer.